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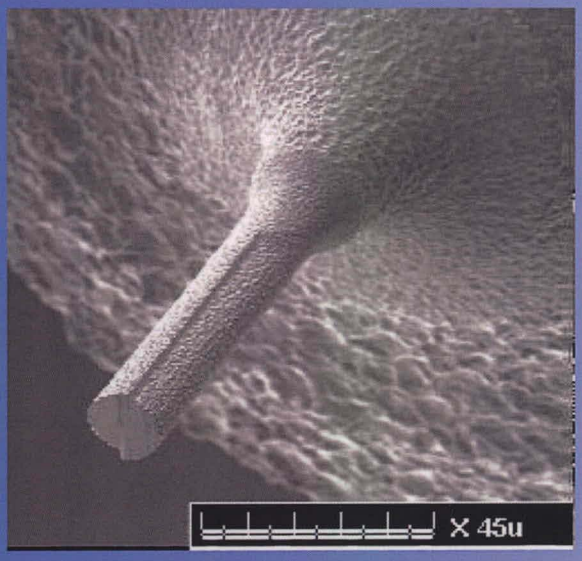

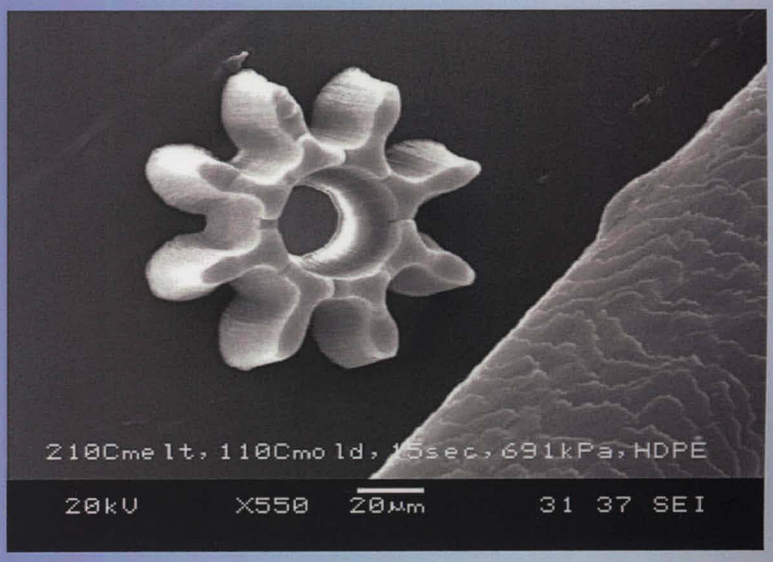

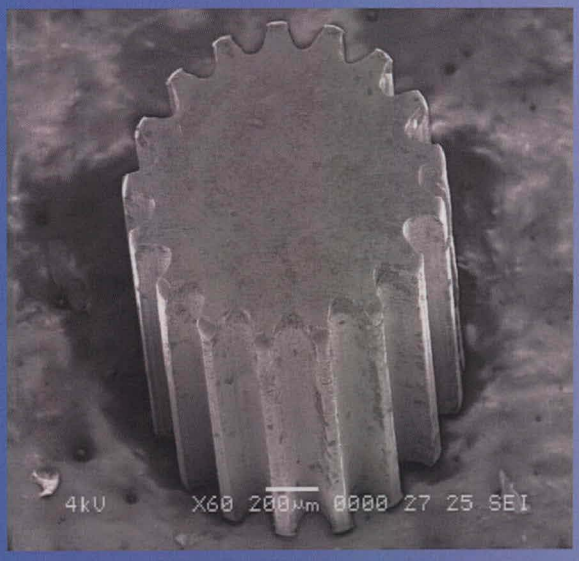

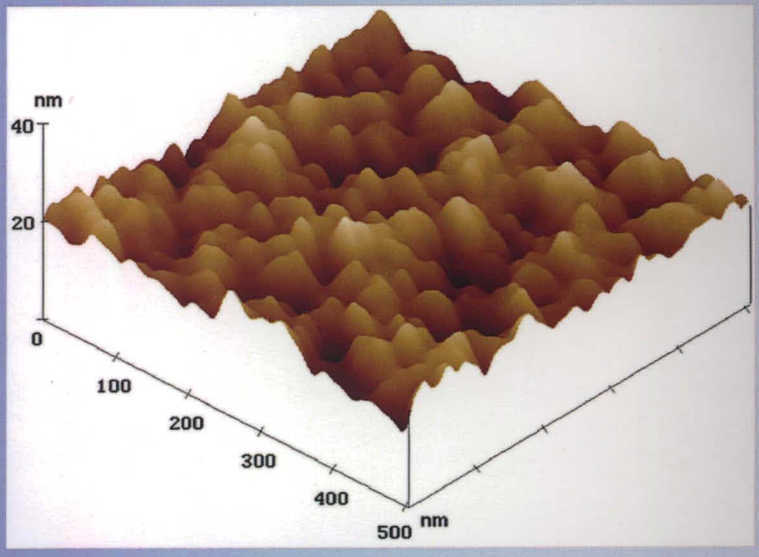

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Chapter 17

Investigation of MRR for Finish Cut of Titanium Alloy using Micro Electro Discharge Milling

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Keywords: Material removal rate (MRR), Titanium alloy, Micro electro discharge machining (Micro EDM).

Abstract. This project aims to investigate the finish cut of micro electro discharge milling for nano surface finish in response to material removal rate (MRR). From the ANOVA and S/N ratio analysis, the statistical models have been developed using L18 (2^1 x 2^3) Orthogonal arrays design of experiment. The significant process parameters and the possible optimum solution of machining parameters to achieve maximum MRR were also being obtained The optimum solution with combination of all machining parameters for maximum MRR by using Design Expert 7.1.5 is 0.899 or 89.9% desirable to get value of capacitance = 100 nF, gap voltage = 80 V and feed rate = 1 μm/sec, with optimized value of MRR = 57.8 μg/min. Optimized machining parameters were used in verification experiments, where the response were found very closed to the predicted values.

Introduction

The process parameters in micro ED milling influence material removal rate (*MRR*), surface quality (SQ) and tool wear rate (*TWR*). Finish cut process mean to sacrifice the *MRR* in order to get high SQ. Investigation of parameters for the multiple-response optimization of micro ED milling have been done few [1,2]. However, there is no research in focusing for finish cut of ED milling to achieve nano surface quality. Machining principle of micro ED milling is similar to conventional macro ED milling. A series of discrete sparks occur between the workpiece and the rotating tool electrode. Then the workpiece is fed to the electrode in designed path. The movement is controlled numerically to achieve the desired shape and accuracy of the workpiece. This research studied the significant process parameters of micro ED milling in response to *MRR*. optimal solutions of process parameters for multiple-response of and to achive nano suface finish for applications in MEMS (microelectromecahanical systems) and other micro technology.